

State of Iowa - Return on Investment Program / IT Project Evaluation**SECTION 1: PROPOSAL**

Tracking Number (For Project Office Use)

Project Name: Statewide Imagery Web Application Date: 9/27/00

Agency Point of Contact for Project: Michelle Lantermans

Agency Point of Contact Phone Number / E-mail: michelle.Lantermans@its.state.ia.us

Executive Sponsor (Agency Director or Designee) Signature: _____

Is this project necessary for compliance with a Federal standard, initiative, or statute? (If "Yes," cite specific requirement, attach copy of requirement, and explain in Proposal Summary) ☐ Yes ☒ No

Is this project required by State statute? (If "Yes," explain in Proposal Summary) ☐ Yes ☒ No

Does this project meet a health, safety or security requirement? (If "Yes," explain in Proposal Summary) ☐ Yes ☒ No

Is this project necessary for compliance with an enterprise technology standard? (If "Yes," explain in Proposal Summary) ☐ Yes ☒ No

Does this project contribute to meeting a strategic goal of government? (If "Yes," explain in Proposal Summary) ☒ Yes ☐ No

Is this a "research and development" project? (If "Yes," explain in Proposal Summary) ☐ Yes ☒ No

PROPOSAL SUMMARY:

1. The Iowa Geographic Image Map Server has been publicly serving USGS DOQQ and DRG data for the state of Iowa since March of 1999. At the present time the server is distributing all currently available USGS DRG and DOQQ data for the state of Iowa. The server has statewide coverage for 1:100,000 and 1:24,000 scale DRG data, and DOQQ data is available for 39 counties. The remaining DOQQ will be provided by USGS and NRCS.

The Iowa Geographic Image Map Server was built upon the MIT Image Server Technology. The Image Server uses a scale dependent pyramid structure to provide image resolution that is applicable to the user-defined view. This pyramid storage structure concept has quickly moved from theory to standard application as Lizard Tech, Inc. and other software vendors have recognized the efficiency of this structure. One of the strengths of the MIT technology is that all software used are free and widely available. The server is powered by APACHE web server software and utilizes CGI, PERL, C++, and HTML programming languages. The server is supported by a 100MB network infrastructure through Iowa State University and physically resides in the ISU GIS Facility.

Strengths of the current data server include:

- Creates a user-defined image on the fly
- Navigates around the image view with simple point and click interface
- Moves from scale to scale
- Defines view height & width
- Provides options to go directly to points of interest, e.g. State Capitol, State Park, etc.
- Permits users to download data in multiple formats

Another strength of the MIT Technology is its ability to link metadata with an image. The project plan includes tasks that will fully integrate FGDC compliant metadata into the application.

The proposed project would build upon the existing server implementation and expand it in the following areas:

- Serve additional framework geographic datasets for Iowa including: all currently available DOQQs, Landsat 7 imagery, landcover, soils, and digital elevation models (DEMs). In addition, expansion of our storage capabilities will allow us to display current DOQQs at full 1-meter resolution.
- Through the IGIC, serve local and county acquired digital orthophotography. Currently there are ten county governments needing this service to serve their constituents.
- Development of additional server functions, including serving the data as an attributed grid, display of vector overlays, and access to the data in the NAD27 and NAD83 datums.
- Development of new tools to the access the datasets via existing GIS software, including ArcInfo 8.
- Deploy new hardware dedicated to the Image Server.

2. The citizens of Iowa that rely on map-based, often called spatial, information regularly utilize data that is referred to as “remote sensing” data. The definition of remote sensing can be very broad, but for the purposes of this project the definition of remote sensing will include only aerial or satellite images. Many professionals in Iowa use remote sensing data. Farmers, farm management companies, natural resource agencies, urban planning organizations, transportation design and planning offices, hydrologists, business locators, and many other professionals utilize remote sensing data to make better decisions about how to manage Iowa’s resources and infrastructure.

Due to the cost of creating reliable and quality remote sensing products, very few agencies take on the task of creating their own remote sensing data. The United States Geological Survey (USGS) used federal tax dollars to produce a nationwide aerial image coverage. This dataset can be purchased and made available to the public through whatever means the purchaser chooses.

Iowa State University, the Natural Resources Conservation Service, Massachusetts Institute of Technology and other partners have developed and deployed a pilot web-enabled application to view and download the USGS products. This proposal outlines the desired direction of this pilot web application and details the necessary funding to further deploy and support this project. If this current project is not funded, a no cost, public source for this data may not be available and the project will never be more than a research/pilot project.

The implementation of this project is the first step in a long-term strategy. As cities grow and the land use changes, aerial photography and satellite imagery become obsolete. Long-term support of this project requires the future update of imagery data. The Iowa Geographic

Information Council (IGIC) Remote Sensing Committee will define the preferred strategy for developing future statewide imagery. This may, or may not, include the USGS products; but will provide the best product for an acceptable cost.

3. This project is a multi-organization effort. Iowa State University is the current primary coordinator, but many organizations have significantly contributed to the current effort. The goals of a single organization are not represented here, but instead, large portions of the Iowa citizenry propose this project as a necessary information source. This claim is made based on the continued requests for availability of this information. These requests were identified by many of the involved organizations and the IGIC. Support of this project will help the IGIC meet the Data Development and Stewardship goal of its Strategic Plan. Meeting this goal does not bring money to the IGIC directly, but gives it greater strength as an organization. As members of the IGIC see the tasks that have been accomplished, greater involvement in the organization and its mission will be achieved.

The proposed project would be carried out through partnerships with the following organizations:

- 1) Iowa State University Geographic Information Systems Support and Research Facility (ISU) <http://www.gis.iastate.edu/>
- 2) USDA Natural Resources Conservation Service, Iowa Geographic Information Systems Office (NRCS-IOWA) <http://www.ia.nrcs.usda.gov>
- 3) Iowa Department of Natural Resources Geological Survey Bureau (IDNR) <http://www.igsb.uiowa.edu/nrgis/gishome.htm>
- 4) Iowa Geographic Information Council (IGIC) <http://www.gis.state.ia.us/>
- 5) USDA Natural Resources Conservation Service National Cartography and Geospatial Center (NRCS-NCGC) <http://www.ftw.nrcs.usda.gov/ncg/ncg.html>
- 6) Massachusetts Institute of Technology Dept. of Urban Studies and Planning (MIT) <http://tull.mit.edu/>
- 7) Iowa Department of Transportation (IDOT) http://www.msp.dot.state.ia.us/trans_data/index.html
- 8) USDA Natural Resources Conservation Service Natural Resources Inventory and Analysis Institute <http://www.statlab.iastate.edu/survey/NRI/IAI/nriai.html>

SECTION 2: PROJECT PLAN

Individual project plans will vary depending upon the size and complexity of the project. A project plan includes the following information:

1. Agency Information

Project Executive Sponsor Responsibilities: Richard Varn, Chief Information Officer

Organization Skills: Organizational and cooperative skills comprise those most needed for this project. Both of those skills are adequately represented in this department.

2. Project Information

Mission, Goals, Objectives:

A partnership and involvement with the IGIC and Iowa GIS Clearinghouse is integral for the completion of the proposed project. The primary objectives of the IGIC are to: act as a clearinghouse for GIS information and expertise in Iowa, encourage the development of open GIS standards, and facilitate the voluntary exchange of data among GIS users in Iowa. The proposed project is in direct agreement with these objectives. In fact, this project will strengthen these ties by serving orthophotography data from counties and local governments that they could not share or serve on their own.

A. **Expectations:** The following benefits of finalizing and deploying this application are:

- State, county and local government agencies can utilize the imagery in their GIS, planning and engineering environments.
- Many smaller government entities cannot afford to create or purchase remote sensing data, although many local governments have daily uses for this type of data.
- Many smaller government entities cannot afford to distribute their image data effectively, although it is widely needed. This application will allow local datasets to be served as well as the USGS data.
- This web site will provide information to the citizens of Iowa at no cost. Large areas can get costly to purchase from USGS due to a per image charge.
- The web site will provide immediate access to information, no need to order data and wait three weeks for a CDROM.
- Multiple agencies or government bodies will not have to purchase the imagery from USGS. The current state and federal investment can be further leveraged.
- The imagery will be provided in an easy to use format, preventing end users from having to do excessive data manipulation. Current image sources usually require a high level of expertise for image use. The web site will be as easy to use as any other web page.
- The web site will be a clearinghouse of information on the availability of Iowa imagery, and will thus save citizens and businesses from wasting time finding information they need.

The web site will provide this imagery to all Iowa citizens, allowing them to have better information.

B. **Measures:** The most obvious measure of effectiveness for this application is to monitor use and number of “hits” to the web page. Server log files show that the server is being accessed from many states and other countries, so we believe that

when the full DOQQ coverage is available and it is better linked to other information, this web page will be very popular.

- C. **Environment:** Iowa State University, the Natural Resources Conservation Service, Massachusetts Institute of Technology and other partners have developed and deployed a pilot web-enabled application to view and download the USGS products. This project is a multi-organization effort. Iowa State University is the current primary coordinator, but many organizations have significantly contributed to the current effort. The goals of a single organization are not represented here, but instead, large portions of the Iowa citizenry propose this project as a necessary information source. This claim is made based on the continued requests for availability of this information. These requests were identified by many of the involved organizations and the IGIC.
- D. **Project Management and Risk Mitigation:** The risk on this project is low. The research portion of the project is already completed, so the risk that the proposal is unachievable is nonexistent. The technology is well tested and a web site is deployed as a pilot/prototype. This project will simply take the application to its full potential and provide dedicated resources and equipment.

It is proposed that the ISU GIS Facility Director manage this project. The Director is knowledgeable in this area and has responsibility for other projects of similar scope and budget. In addition, much of the equipment is currently on site at, or near, ISU and the expertise for the system is available or easily attainable from that site.

Security / Data Integrity / Data Accuracy / Information Privacy: The technology is well tested. The datasets were developed by state and federal agencies in compliance with established standards for geospatial data development. The data will be served in a common projection and datum, in compliance with OpenGIS Consortium and FGDC standards.

3. Current Technology Environment (Describe the following):

A. Software (Client Side / Server Side / Midrange / Mainframe)

Client Software

The only requirement for the end user's client machine is a connection to the Internet and a web browser. Many browsers will work, including Microsoft Internet Explorer, Netscape Navigator and AOL.

As an alternative, more sophisticated users can link to the server using GIS software.

- Environmental Systems Research Institute – ArcView extension
- MapInfo Corp. – MapInfo extension.

Server Software

UNIX Operating System

APACHE Web Server

Massachusetts Institute of Technology - Image Server Software

B. Hardware (Client Side / Server Side / Mid-range / Mainframe):

Server Hardware
Sun UNIX Server (on loan for prototype)

4. Proposed Environment (Describe the following):

A. Software (Client Side / Server side / Mid-range / Mainframe)

Client Software

The only requirement for the end user's client machine is a connection to the Internet and a web browser. Many browsers will work, including Microsoft Internet Explorer, Netscape Navigator and AOL.

As an alternative, more sophisticated users can link to the server using GIS software.

- Environmental Systems Research Institute – ArcView extension
- MapInfo Corp. – MapInfo extension.
- Environmental Systems Research Institute – ArcInfo 8

Server Software

UNIX Operating System

APACHE Web Server

Massachusetts Institute of Technology - Image Server Software

ArcIMS (web-enabled GIS)

B. Hardware (Client Side / Server Side / Mid-range / Mainframe)

Server Hardware

Sun UNIX Server (dedicated to application)

200GB RAID Unit

Data Elements: One primary component of the proposed project involves the processing and serving of additional geographic datasets, including DOQQs, DEMs, landcover, Landsat 7 imagery, county produced aerial photography, and soils. These datasets are important base layer themes of the FGDC Framework. The datasets were developed by state and federal agencies in compliance with established standards for geospatial data development. The data will be served in a common projection and datum, in compliance with OpenGIS Consortium and FGDC standards.

Project Schedule:

A list of project tasks is identified below. Many listed activities will occur simultaneously over the course of the project. A detailed project plan will be developed once the funding level is identified. The exact plan will depend on whether ISU, State of Iowa, or independent contractor personnel are allocated to the project for the necessary skills. Until the funding and the specific technical staff are identified, it is difficult to develop a specific timeline due to training, hiring and contract unknowns. The current plan is to complete the work by the end of fiscal year 2001 (June 30, 2001).

- 1) Acquire server and storage device upgrades.
- 2) Configure and update existing server CGI scripts to OpenGIS-compliant scripts from MIT.
- 3) Data transfer from IDNR, NRCS, USGS, and County/local government sources.

- 4) Data processing; includes conversion of data to standard projection/datum, and building of image pyramids, and image index files.
- 5) Implement graphic vector overlay function through configuration of existing CGI server program. This will include geographic reference overlays, such as county and quadrangle boundaries, that appear during a web browsing session.
- 6) Implement datum shift toggle function through configuration of existing CGI server program. This function will allow users to download imagery in NAD27 or NAD83 datums.
- 7) Develop a program extension for ArcInfo 8 using Visual Basic, PERL, and Java programming, to communicate and access datasets from the server.
- 8) Develop a "grid" download function that will allow users to download specific datasets (e.g., DEMs, soils, landcover) as a raster grid with attributes. This step will be developed primarily with PERL scripts within the server software, with server calls to ArcInfo programs.
- 9) Test server links to partner agency web map servers, including ArcView Internet Map Server, ArcInfo Internet Map Server, and Intergraph GeoMedia.
- 10) Configure existing metadata query function to include metadata for all served datasets, to bring server in compliance with NSDI standards.
- 11) Registration of the server as a NSDI Clearinghouse node, in compliance with OpenGIS criteria.

SECTION 3: Return On Investment (ROI) Financial Analysis

Project Budget:

Provide the estimated project cost by expense category.

Personnel	\$	<u>88,000</u>	
Software	\$	<u>3,000</u>	
Hardware	\$	<u>45,000</u>	
Training	\$		
Facilities	\$		
Professional Services	\$		
Supplies	\$		
Other (Specify)	\$		
Total	\$	<u>136,000</u>	

Project Funding:

Provide the estimated project cost by funding source.

State Funds	\$	<u>136,000</u>	<u>100</u>	% of total cost
Federal Funds	\$			% of total cost
Local Gov. Funds	\$			% of total cost
Private Funds	\$			% of total cost
Other Funds (Specify)	\$			% of total cost
Total Cost:	\$			% of total cost

Provide the estimated project cost by fiscal year.

How much of the cost would be incurred by your agency
from normal operating budgets (staff, equipment, etc.)?\$_____ %

How much of the cost would be paid by requested State IT project funds? \$136,000 100 %

Identify, list, and quantify all additional annual maintenance expenses (State \$\$s) related to the project.

Identify, list, and quantify any other future additional expenses (State \$\$s) related to the project.

ROI Financial Worksheet Directions (Attach Written Detail as Requested):

Annual Pre-Project Cost – State government costs are not expected to be reduced because the web server is not using state funds, thus this portion is not applicable.

Annual Post-Project Cost -- State government costs are not expected to be reduced because the web server is not using state funds, thus this portion is not applicable.

State Government Benefit – Not applicable

Citizen Benefit – With the current structure, no other avenue exists whereby citizens can gain free access to digital imagery except through the image server. If this service were not supported, individual citizens would have to order the imagery from the USGS directly at a cost of \$7.50 per image. In addition, there is a \$5.00 handling charge and \$45.00 processing charge for each order.

Referencing the usage report for the image server January 1, 2000 through November 24, 2000, visits came from approximately 8050 distinct Internet addresses. Each visitor examined 29 documents on average. The server delivered 76,915 unique documents.

Using the figures above, the server has already saved citizens approximately the following amount:

Number of users x (handling + processing charge) =	\$402,500
<u>Number of unique images served x \$7.50 =</u>	<u>\$576,862</u>
Total =	\$979,362

Another benefit of this server is aimed at county and municipal governments. Requests have already come from this group to distribute imagery they have purchased from vendors. To display imagery on their own, each county would need a web server (\$25,000), software to publish the images (+\$5,000) and a server administrator (\$35,000). The state based server could remove this cost. If only 5 counties took advantage of this server over \$325,000 would be saved.

Opportunity Value/Risk or Loss Avoidance Benefit – Not applicable

Total Annual Project Benefit -- \$1,304,362

Total Annual Project Cost – This project has a one-time cost of \$136,000. After its completion, it will not require annual funding.

Benefit / Cost Ratio – 9.59

ROI – 8.59

Benefits Not Cost Related or Quantifiable –

Benefit rating – 7 Support of this project will help the IGIC meet the Data Development and Stewardship goal of its Strategic Plan. Meeting this goal does not bring money to the IGIC directly, but gives is greater strength as an organization. As members of the IGIC see the tasks that have been accomplished, greater involvement in the organization and its mission will be achieved.

Benefit rating – 9 This is a unique application in the nation. No other state has built an image server with all the functionality as this one. Support for the continuation of the server can bring recognition for innovation to the State of Iowa.

ROI Financial Worksheet

Annual Pre-Project Cost - How You Perform The Function(s) Now

FTE Cost (salary plus benefits):	N/A
Support Cost (i.e. office supplies, telephone, pagers, travel, etc.):	N/A
Other Cost (expense items other than FTEs & support costs, i.e. indirect costs if applicable, etc.):	N/A
A. Total Annual Pre-Project Cost:	N/A

Annual Post-Project Cost – How You Propose to Perform the Function(s)

FTE Cost:	N/A
Support Cost (i.e. office supplies, telephone, pagers, travel, etc.):	N/A
Other Cost (expense items other than FTEs & support costs, i.e. indirect costs if applicable, etc.):	N/A
B. Total Annual Post-Project Cost:	N/A
State Government Benefit (= A-B):	N/A

Annual Benefit Summary

State Government Benefit:	
Citizen Benefit (including quantifiable “hidden taxes”):	1,304,362
Opportunity Value and Risk/Loss Avoidance Benefit:	
C. Total Annual Project Benefit:	1,304,362
D. Total Annual Project Cost:	136,000
Benefit / Cost Ratio (C / D):	9.59
ROI (C – D / Requested State IT Project Funds):	859%

☐ Benefits Not Cost Related or Quantifiable (including non-quantifiable “hidden taxes”)

